

Claims

- [1] A substrate cleaning facility having a multi-storied structure, comprising:
a cleaning part including a plurality of process chambers having at least one process bath in which substrates are cleaned and a transfer robot,
wherein:
the process chambers are stacked.
- [2] The substrate cleaning facility of claim 1, wherein:
each of the process baths is configured for performing at least one selected from the group consisting of a chemical treating process, a rinsing process, and a drying process
- [3] The substrate cleaning facility of claim 1, wherein:
each of the process chambers comprises:
a processing part where a plurality of processing baths are disposed; and
a transfer part where a transfer robot is installed to transfer substrates between the process baths.
- [4] The substrate cleaning facility of claim 3, wherein:
the transfer robot of the process chamber having the processing bath in which the drying process is performed, comprises:
a first robot for transferring wet substrates; and
a second robot for transferring dry substrates
- [5] The substrate cleaning facility of claim 2, wherein:
a buffer part where a cassette sojourns is disposed at the respective process chambers.
- [6] The substrate cleaning facility of claim 3, wherein:
each of the process chambers comprises:
a fan filter unit for sending a clean gas into the process chamber;
a first exhaust part configured for exhausting fumes around the processing bath;
and
a second exhaust part configured for forcibly exhausting particles around the transfer part.
- [7] The substrate cleaning facility of claim 6, wherein:
the second exhaust part comprises:
an exhaust pipe connected to a bottom of the transfer part;
a damper for opening and closing a path of the exhaust pipe; and

an exhaust fan for regulating a displacement through the exhaust pipe.

- [8] The substrate cleaning facility of claim 1, further comprising:
an interface part where substrates are transferred between the process chambers.
- [9] The substrate cleaning facility of claim 8, wherein:
the interface part comprises:
a transfer bath containing substrate to prevent exposure of substrates to the air;
and
a transfer bath moving part for allowing the transfer bath to move up and down.
- [10] The substrate cleaning facility of claim 9, wherein:
the transfer bath further comprises a nozzle configured for supplying a cleaning solution thereinto; and
the substrates are transferred between the process chambers while being submerged in the cleaning solution of the transfer bath.
- [11] The substrate cleaning facility of claim 9, wherein:
the transfer bath further comprises a cleaning solution supply pipe connected to a lateral face or a bottom of the transfer bath to supply a cleaning solution thereinto; and
the substrates are transferred between the process chambers while being submerged in the cleaning solution of the transfer bath.
- [12] The substrate cleaning facility of claim 10, wherein:
the cleaning solution is deionized water (DI water).
- [13] The substrate cleaning facility of claim 11, wherein:
when substrates are contained in the transfer bath, a rinsing process is performed in the transfer bath.
- [14] The substrate cleaning facility of claim 10, wherein:
the transfer bath moving part comprises:
a frame extending to have a height from the lowest process chamber to the highest process chamber and having a guide rail;
a slider combined with the guide rail to move up and down therealong; and
a driving part for moving the slider,
wherein:
the transfer bath is mounted at the slider.
- [15] The substrate cleaning facility of claim 10, wherein:
the transfer bath comprises:
an inner bath in which substrates are contained;

a cleaning solution supply part for supplying a cleaning solution into the inner bath; and

an outer bath, disposed to surround an outer sidewall of the inner bath, in which a cleaning solution overflowing from the inner bath is contained.

[16] The substrate cleaning facility of claim 15, wherein:

when the substrates are contained in the transfer bath, a rinsing process is performed in the transfer bath.

[17] The substrate cleaning facility of claim 15, wherein:

the cleaning solution supply part includes a cleaning solution supply pipe connected to a lateral face or a bottom of the inner bath.

[18] The substrate cleaning facility of claim 15, wherein:

the cleaning solution supply part includes a nozzle configured for injecting a cleaning solution to an open top of the inner bath.

[19] The substrate cleaning facility of claim 18, wherein:

a guide plate is installed at the interface part to guide a cleaning solution falling on an outer sidewall of the transfer bath to the inside of the transfer bath or the outside spaced apart from the outer sidewall of the transfer bath.

[20] The substrate cleaning solution of claim 19, wherein:

one end of the guide plate extends inwardly toward an inner sidewall of the inner bath, and the other end thereof extends outwardly toward the outer sidewall of the outer bath.

[21] The substrate cleaning solution of claim of claim 20, wherein:

the nozzle is fixedly installed at a determined position of the interface part; and the guide plate is lower than the nozzle and is higher than the transfer bath when the cleaning solution is filled.

[22] The substrate cleaning facility of claim 19, wherein:

the interface part further comprises a guide plate moving part for moving the guide plate to be in a guide state where the flow of a cleaning solution is guided while the cleaning solution is supplied into the transfer bath and in a non-interference state where the movement of the transfer bath is not interfered.

[23] The substrate cleaning facility of claim 10, wherein:

the transfer bath includes an exhaust valve configured for exhausting a cleaning solution; and

the exhaust valve is made of an elastic member to continue to cut off its outlet when an external force is not applied.

- [24] The substrate cleaning facility of claim 23, wherein:
the exhaust valve comprises:
a body;
a shield plate opposite to a bottom of the body in the body to open and close the outlet of the exhaust valve; and
a spring installed in the body to press the shield plate.
- [25] The substrate cleaning facility of claim 24, wherein:
the interface part further comprises a switch for opening and closing the exhaust valve,
wherein:
the switch comprises:
a rod;
a body having a space into which at least a part of the rod is inserted and including first and second openings acting as a path through which a fluid flows in or out; and
a separation plate moved between formed positions of the first and second openings by the fluid flowing in through the first or second opening,
wherein:
simultaneously to movement of the separation plate, the rod pushes up the separation plate to open the exhaust valve.
- [26] The substrate cleaning facility of claim 25, wherein:
the switch further comprises a gas injection part for injecting a dry gas to the injection valve to dry the exhaust valve,
wherein:
the gas injection part comprises:
an injection line being a hole through which the separation plate and the rod to penetrate; and
an inflow port formed at the body to supply a dry gas to the injection line while the rod moves to close the exhaust valve.
- [27] The substrate cleaning facility of claim 9 further comprising:
a loading/unloading part in which a cassette is contained; and
an aligning part disposed between the loading/unloading part and the cleaning part to convert each substrate to a vertical state to a horizontal state or vice versa.
- [28] The substrate cleaning facility of claim 27, wherein:
the loading/unloading part comprises:

an in/out port at which a cassette loaded/unloaded to/from the facility is placed;
and

a stocker disposed between the in/out port and the cleaning part to temporarily contain the cassettes,

wherein:

the stocker comprises:

a rack on which cassettes are placed; and

a robot for transferring the cassette.

[29] The substrate cleaning facility of claim 27, wherein:

the aligning part comprises at least one aligner for converting substrates to a vertical state from a horizontal state.

[30] The substrate cleaning facility of claim 29, wherein:

the aligner comprises:

at least one horizontal return robot for putting/drawing substrates in/out of a cassette; and

a rotatable repositioning device containing substrates returned by the horizontal return robot.

[31] The substrate cleaning facility of claim 30, wherein:

the aligner further comprises a pusher for separating substrates from the repositioning device to transfer the substrates to the cleaning part.

[32] The substrate cleaning facility of claim 27, wherein:

the substrates are cleaned while being transferred along a loop shape of the aligning part, a first process chamber being one of the process chambers, the interface part, a second process chamber being the other of the process chamber, and the aligning part.

[33] The substrate cleaning facility of claim 32, wherein:

the cleaning baths are arranged in a row according to the order of processes performed in the first and second and process chambers.

[34] A method for cleaning substrates in a cleaning facility having a multi-storied structure, the method comprising:

transferring substrates to a cleaning part having at least two layer-partitioned process chambers from a cassette placed at a loading/unloading part;

performing a part of cleaning processes for substrates in a first process chamber being one of the process chambers;

transferring the substrates to a second process chamber being the other of the

process chambers;
performing a part of the cleaning processes for the substrates in the second process chamber; and
containing the substrates in the cassette placed at the loading/unloading part.

- [35] The method of claim 34, wherein:
each of the first and second process chambers comprises a plurality of process baths arranged in a row according to the order of processes performed in the first and second process chambers; and
the substrates are transferred along a loop shape.
- [36] The method of claim 35, wherein:
When the substrates are transferred from the first process chamber to the second process chamber, they are not exposed to the air.
- [37] The method of claim of claim 36, wherein:
the transferring substrates from the first process chamber to the second process chamber comprises:
placing the substrates completely subjected to a part of the processes in the first process chamber into a transfer bath disposed one side of the first and second process chambers;
transferring the transfer bath up and down; and
drawing the substrates out of the transfer baths to be transferred to the second process chamber.
- [38] The method of claim 37, wherein:
when the transfer bath is transferred from the first process chamber to the second process chamber, the transfer bath is filled with deionized water (DI water).
- [39] The method of claim 37, further comprising:
repositioning the substrates from a horizontal state to a vertical state before a process is performed in the first process chamber; and
repositioning the substrates from a vertical state to a horizontal state after a process is completed in the second process chamber.
- [40] The method of claim 37, further comprising:
performing a rinsing process in the transfer bath while the substrates are transferred between the process chambers.